

Appendix 1

Lee Valley Heat Network

- the Compelling Story

October 2012

The case for the Lee Valley Heat Network and its potential to provide affordable low to zero carbon heat for the area



Summary

This document sets out the compelling case for the Lee Valley Heat Network. This new city-scale decentralised energy (DE) network will capture affordable low carbon heat from waste to energy facilities and dedicated Combined Heat and Power (CHP) plants, supplying it to buildings and industry across the Lee Valley for use in space heating and hot water production.

A decentralised heat network is a system of pipes that move energy in the form of hot water and/or steam from where it is created, to where it is needed, much like an electricity network.

The Lee Valley Heat Network will initially use heat and steam from the Energy from Waste (EfW) facility at the Edmonton EcoPark. This facility already generates enough heat to kick-start a strategic network.

Over time the network will connect additional heat sources elsewhere in the Lee Valley, including local gas-fired and renewable Combined Heat and Power (CHP) schemes, and be extended to serve additional heat demand from new industrial customers and buildings.

Feasibility work has confirmed that the resultant 'Strategic Heat Network' can deliver heat to sites across the Lee Valley, including sites in Enfield, Haringey and Waltham Forest. The Lee Valley Heat Network will deliver significant economic, environmental and social benefits greater than would otherwise be achieved by individual developments:

- Facilitate inward investment and new jobs
- Provide affordable low carbon heat to businesses, industries, the public sector and local residents across the Lee Valley, including the new Meridian Water development
- Help tackle fuel poverty, reducing heating costs for residents living in some of London's most deprived neighbourhoods
- Reduce London's carbon footprint

This document highlights the progress made to date, the opportunities available and the work being undertaken to address the risks for this strategic infrastructure project.

Recognising the Lee Valley Heat Network's ambitions for the capital, the Greater London Authority is providing technical support to enable this project to form *'The strategic scheme to demonstrate decentralised heat in London.'*

Other major DE networks at Euston Road in Camden, linking Whitehall and Pimlico, on the Greenwich Peninsula and on the Ladderswood Estate in Enfield will use gas powered CHP, whilst the Olympic Park and Stratford City heat network uses a combination of gas powered CHP and biomass boilers.

The Mayor of London's Vision towards 2050 is for smaller heat networks to join together with similar satellite schemes to form integrated networks on a city scale. These city-scale networks will enable affordable low to zero carbon heat from a range of sources to be utilised by

The Lee Valley Heat Network is a strategic infrastructure project. As with any scheme of this nature, it is not without its challenges. Project risks have however been balanced against potential benefits, where the scheme as a whole represents the opportunity to create the first viable heat network of its kind in London.

Existing research confirms the Lee Valley Heat Network's technical and potential commercial viability:

- Technically viable: the Lee Valley Heat Network will use a mature, well established pipe technology that has been employed for many decades to deliver hot water (or steam to industry) for heating, using a network of highly insulated steel pipe work. The energy (electricity, heat and steam) to feed this network of pipes can be generated from a number of sources, including Energy from Waste facilities, biomass and biomethane or conventional gas-fired Combined Heat and Power (CHP).
- Commercially viable: local authority leadership and public funding will be required to kick start the infrastructure network, de-risking the scheme for future private sector investment. It is forecast that this pump priming will make the Lee Valley Heat Network self-financing by 2023

This is why such a wide range of delivery partners are so committed to developing the Lee Valley Heat Network:

Partner organisations

- London Borough of Enfield
- London Borough of Haringey
- London Borough of Waltham Forest
- Greater London Authority
- North London Strategic Alliance
- North London Waste Authority

21st Century Infrastructure

World class, 21st century infrastructure doesn't happen by accident.

Whether it is the capital's roads, its sewers or its railways, much of London's infrastructure was designed, built and well-used before the start of the twenty-first century.

Combined with the degradation of age, the last twenty years have seen changes to demand through population growth, as well as changes to our understanding of the impact that the use of our long-term infrastructure has on the planet. These city-wide and global shifts are placing demands on our infrastructure that are forcing governments, planners and engineers both to think differently, and to face some big decisions. Infrastructure solutions are **already being delivered** in innovative ways.

- London is currently the venue for Europe's biggest construction project: Crossrail. When it opens in 2018, the central section of the line will see 24 trains per hour, each with a capacity of 1,500 people
- In June 2010, HRH Duke of Edinburgh opened the UK's first desalination plant in Beckton, giving Thames Water the capacity to produce 150 million litres of drinking water a day, which is enough to supply 400,000 households or 900,000 people

Future ideas are also being discussed for long term plans to meet transport, utility and logistic needs, and more are needed.

Energy from Waste is the process of creating energy in the form of electricity or heat from the incineration of a waste source. It is a form of energy recovery. Under the Waste Incineration Directive, any heat generated by Energy from Waste (EfW) plants should be recovered as far as practicable. In the UK, new EfW plants are required to be designed to be CHP-ready. For existing EfW plants, Renewable Obligation Certificates (ROCs) can be claimed on the biomass portion of fuel consumed if waste heat is recovered and used.

Energy supply is an integral part of the infrastructure picture. It is clear that energy supply must develop in a variety of ways to respond to current challenges, and that heat is an integral part of this response. As the Department for Energy and Climate Change (DECC) states in its new Heat Strategy: 'Heat is the single biggest reason we use energy in our society. We use more energy for heating than for transport or the generation of electricity. This year the UK will spend around £33 billion on heat across our economy.'

Heat presents a significant economic, environmental and social opportunity, becoming a major new infrastructure prospect. The Lee Valley is in a prime location to be a major part of London's decentralised energy landscape, and in the vanguard of this investment in heat.

The Lee Valley Heat Network has the potential to deliver a number of benefits:

- Inward investment, new jobs and wider regeneration
- Affordable low carbon heat for businesses, industries, the public sector and local residents
- Decoupling energy supply from fossil fuel prices and reduce fuel poverty

- Reducing carbon dioxide emissions by at least 200,000 tonnes over the life of the project
- Facilitating DECC's ambition to move towards a zero carbon heat supply in domestic properties by 2050
- As a further essential part of London's long term infrastructure jigsaw, the Lee Valley Heat Network will support the capital's infrastructure needs for the twenty first century

What are Decentralised Energy and Heat Networks?

Decentralised Energy (DE) refers to a wide range of technologies that do not rely on the high-voltage electricity transmission network or gas grid. A typical form of DE is the generation of electricity at or near the point of consumption, combined with the capture and utilisation of 'waste heat' associated with the electricity generation process. This heat is captured, distributed and used locally through a heat network made of highly insulated pipes for use by industries, the public sector, local residents and others. In a CHP network, heat may be the primary form of energy to be generated, with electricity as the secondary product. The DE approach enables higher fuel conversion efficiencies and lower electricity distribution losses.

The energy (electricity, heat and steam) can be generated from a number of sources, including Energy from Waste facilities, biomass and biomethane or conventional gas-fired Combined Heat and Power (CHP). Heat Networks are more sustainable than the existing centralised electricity generating system, where the waste heat generally is not captured for use in heat

London's future

The ambition to reduce carbon dioxide emissions is already within London wide and national plans. These ambitions are based on evidence from work such as the Stern Review, which reported the environmental and economic consequences of not responding to our changing climate, and DECC's Heat Strategy published in March 2012.

The Mayor has made a commitment in the London Plan to achieve an overall **reduction in London's carbon dioxide emissions of 60%** (below 1990 levels) by 2025. This is supported by the Mayor's Climate Change and Energy Strategy, October 2011.

The London Plan also aims for **25% of heat and power used in London to be generated through the use of localised decentralised energy systems by 2025.**

Lee Valley: the opportunity

Work undertaken to date has identified the potential for a decentralised heat network in the Lee Valley, which present a significant opportunity and benefits for the Lee Valley:

- **Secure additional jobs** by attracting new industry to the region to take advantage of the financial savings offered by the heat network. This is particularly important for heat intensive industries such as brewing, food manufacture, paper and pulp. Already there has been strong industry interest and the early potential to bring 100 new jobs to the Lee Valley

- Provide **affordable low-carbon heat** to reduce the energy bills for businesses, industry, the public sector and residents within London
- Increase **energy security** for London
- Help to **alleviate fuel poverty** in some of London's most deprived areas, including areas of high deprivation in Enfield and Haringey in close proximity to the Edmonton EcoPark
- **Reduce costs for developers** by providing an efficient means of achieving the latest sustainability standards required by the Code for Sustainable Homes and revisions to Building Regulations
- **Reduce North London's carbon dioxide emissions by more than 200,000 tonnes** over the life of the project, which is enough to fill over half a million London buses
- Provide **long-term energy infrastructure** that will allow London to benefit from future technological development at low cost
- New district heating businesses will **add diversity to an energy market that is currently dominated by six large companies**, connecting local people and organisations to their local energy supply, and raising awareness of energy issues

The Lee Valley Heat Network and its feasibility

The Lee Valley Heat Network is an ambitious scheme, which needs to be able to stand alone but also have the capacity to expand and integrate easily with neighbouring London heat networks.

The case is clear for public and future private investment. With confident and ambitious local leadership by the London Boroughs of Enfield, Haringey and Waltham Forest, combined with the backing of the Greater London Authority, the Lee Valley will become a key location for meeting London's future heat needs.

The market and policy context mean that a commercial company would not be able to finance the infrastructure required to kick start the network. This is why the public sector is leading in planning for and delivering the initial phases of the Lee Valley Heat Network.

Over time the network has the potential to deliver heat across a range of sites in the Lee Valley. These sites would be focussed on a number of clusters, including new developments that are likely to be built in the coming years and where there are higher building densities. The benefits will be spread across the public and private sectors.

The initial phases of the Lee Valley Heat Network will be developed around the existing Edmonton EcoPark by accessing a portion of the waste heat generated there. This will provide a combination of low temperature hot water (LTHW) to heat residential, commercial and public sector buildings, as well as a high temperature steam link for industrial uses. This mixed facility gives the area the ability to attract industries to the area as well as support existing ones.

The Edmonton EcoPark will be redeveloped over the coming years, providing an opportunity to host a long-term source of heat to supply the Lee Valley Heat Network.

The development of satellite projects across the three boroughs, as a first step beyond the initial use of the existing EfW plant at Edmonton, also shows the medium and longer term aspirations of all partners.

The challenge is to develop a kick-start scheme that can be financed, while retaining the capability for it to link up to other schemes. To enable the kick-start scheme to happen, demand needs to be aggregated through a key set of physical network connections, such as at White Hart Lane and Meridian Water. Further demand will then be added to increase the extent and efficiency of the network.

The business case

As well as the technical feasibility and local requirements of a network, there is a need to ensure that there is a strong business case for the Lee Valley Heat Network. Early analysis of the proposed scheme using the standard Treasury Green Book approach for a strategic infrastructure project shows that the network will have a positive whole life cost.

It is anticipated that the core scheme can be financed from a range of sources including the London Energy Efficiency Fund, Energy Company Obligation, Community Infrastructure Levy and direct local authority investment.

Financial analysis suggests that, following this pump priming, by 2023 there will be a long-term commercial return on investment in the heat network. The Lee Valley Heat Network can then be taken to market as a viable commercial entity. Over £15m of private sector investment could be attracted by year 2023, forecast to deliver a 12% return over 20 years.

Major potential customers have already been part of initial discussions and expressed an interest in the Lee Valley Heat Network. The formal basis for their participation is now being developed. Significant heat savings will arise when compared to a business-as-usual model, and whilst some of the savings will be used to pay for the scheme, there will be financial savings passed on to customers signing up. Initial estimates put these at between £50,000 and £100,000 per annum for key primary sites.

And these are just the initial customers. It is envisaged that once the strategic network is in place, other customers will also quickly buy into the network. This potential is already demonstrated by existing heat networks in cities such as Birmingham, Nottingham, Sheffield and Southampton.

For the **North London Waste Authority (NLWA)**, extraction of steam/hot water from the existing Energy Centre will involve some adjustment to its infrastructure. It will also produce additional revenue. Long-term heat generation can easily fit alongside the new waste facilities being planned by the NLWA to provide effective long term use of the site. This demonstrates the very real potential of the Edmonton site, providing a clear and mutually beneficial business case for both waste and heat supply in the area.

In parallel to business case development, work is already underway to establish a **new company** to deliver the Lee Valley Heat Network on behalf of participating local authorities, working closely with potential heat loads and customers.

It is clear that there are economic advantages for customers, for the NLWA and for potential investors in the delivery vehicle for the heat network. There are also substantial carbon emissions reductions in prospect. All three of these groups have a stake in the business opportunity, as do the GLA and the London Boroughs of Enfield, Haringey and Waltham Forest. By securing the financial investment required to develop the kick start network, the Lee Valley Heat Network will deliver significant economic, environmental and social benefits for London.

The Role of the GLA, London Boroughs and the North London Waste Authority

The Greater London Authority (GLA) is leading the work to deliver the sustainability agenda across London, working closely with the 32 London Boroughs and the City of London to deliver a wide range of infrastructure programmes. This includes providing technical support for the Lee Valley Heat Network, increasing the energy performance of London's public sector buildings through the REFIT programme and improving the energy efficiency of dwellings and businesses through the Green Deal and the Energy Company Obligation (ECO).

The NLWA is working to reduce waste costs and increase recycling rates on behalf of the 7 North London Boroughs of Barnet, Camden, Enfield, Hackney, Haringey, Islington and Waltham Forest.

The London Borough of Enfield, working in partnership with the GLA, the London Boroughs of Haringey and Waltham Forest, the NLWA and the North London Strategic Alliance (NLSA), is leading development of the Lee Valley Heat Network. This will create tangible benefits for North London. Other authorities are leading similar opportunities elsewhere in London:

- The London Borough of Camden is delivering a scheme in Gospel Oak with heat from the Royal Free Hospital. There is also a large scheme being developed on the Euston Road. Collectively these schemes will create new ways to take heat networks to the market
- The London Borough of Haringey is working with a range of experts through their Carbon Commission, examining how local areas can take greater leadership to maximise carbon reduction opportunities
- Islington and Haringey Councils are Anchor Boroughs for The Green Deal, working in partnership with Waltham Forest. Haringey is in parallel investigating options for License Lite to enable local decentralised generators to sell their electricity output directly to consumers including residents. Without the licence, electricity is sold at wholesale prices whereas with the licence, electricity is sold at higher retail prices. This higher revenue stream could positively impact upon the emergence of decentralised energy and its business case.

These are just a selection of sustainability initiatives being led by the GLA, London Boroughs and the NLWA, which highlights the importance of partnership working to enable London to collectively reap the economic, environmental and social benefits for the capital. This project requires strong partnership work, local and sub-regional leadership, and a commitment to securing the long-term benefit for London. All the North London Boroughs should eventually be able to participate in and benefit from the Lee Valley Heat Network and its linked schemes.

Making it happen

Given the technical feasibility of the Lee Valley Heat Network and its market potential, there are a number of steps that need to be taken to make this strategic scheme a reality.

This detailed timetable of work will become clearer as the involvement of GLA's new Decentralised Energy Project Delivery Unit (DEPDU) increases in the coming months.

What	When?
The principles for the future development of the Edmonton EcoPark will be outlined and guided within a Planning Brief which can support the waste requirements of the site in the most sustainable way possible and the strategic heat network requirements. The Planning Brief is being prepared and will be available for consultation later this year.	Endorsed by the Planning Authority end of 2012
The London Borough of Enfield and the GLA need to work with partners to determine the structure of the special purpose vehicle to deliver the Lee Valley Heat Network and take this to scheme to market over the coming years	March 2013
The procurement of a Waste Services Contract for North London by the NLWA in a way which does not preclude the use of the site to host heat generation for a strategic heat network	June 2013
The stakeholders involved in delivering the strategic 'kick-start' network need to agree initial contracts and heads of terms which are mutually advantageous and deliver the strategic heat network	Summer 2013
Alterations to the Edmonton incinerator	End of 2013

Conclusion – the Lee Valley Heat Network

Evidence collected to date confirms that the Lee Valley Heat Network is technically feasible and that there is a strong case for financial sustainability. Although more work is needed to take the scheme to market and deliver it for London, there is already sufficient evidence to confirm the need for continued strong and active leadership to deliver the Lee Valley Heat Network.

The Lee Valley Heat Network, as the Greater London Authority's strategic scheme to demonstrate decentralised heat on a city-scale in London, has the potential to be:

- A key driver for inward investment, job creation and economic growth
- Financially sustainable
- An affordable low carbon heat solution
- Mutually beneficial to a range of stakeholders

This could be the boost that London as a whole needs to make a step change in its progress towards achieving the Mayor of London's 25% energy production through decentralised energy by 2025.

With local leadership, advanced Planning Frameworks and a strong case for public sector investment to de-risk the scheme and bring it to the point of being commercially viable, the Lee Valley Heat Network already has strong interest from industry and early potential for 100 new jobs in the Lee Valley.